Some Recent Lepidopterous Outbreaks on the Island of Hawaii

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In September, 1953, Senator William Nobriga reported considerable damage to the koa forests (*Acacia koa*) in the upper regions of Keauhou Ranch. This was investigated and confirmed on September 22, 1953. It was found that the peak of infestation apparently took place between July and August and approximately 1,280 acres of koa forest were denuded. The Kilauea Forest Reserve adjacent to Keauhou Ranch was also affected but the extent of damage could not be determined in the time available. The estimation was greatly aided from a vantage point on Puu Lalaau (5,517 ft. elev.) which overlooked the denuded koa forests between 4,900 and 4,500 ft. elevation. Although caterpillars were not found on the survey, they were very likely *Scotorythra idolias* Meyrick and *Scotorythra paludicola* (Butler), two species which Perkins reported as defoliating koa in Kona and in the dry forests near Kilauea. Cocoons of the parasite *Hyposoter exiguae* (Viereck) were readily found.

A reconnaissance of the koa forests on Keauhou Ranch two months later indicated that the forests west of Puu Lalaau were recovering from caterpillar depredation, but the forest south of this point was subjected to another wave of caterpillars and the survival of many mature trees was indeed in doubt. Flush growth observed previously had disappeared and thousands of webs were all that remained. Mr. L. W. Bryan, Associate Forester, also reported severe defoliation to the koa forests above Pahala, Kau District, at this time.

In January of this year R. H. Van Zwaluwenburg, Entomologist, H.S.P.A., investigated an armyworm outbreak at South Point, Kau District. Since then outbreaks have occurred in widely distributed localities on the island, mostly in March. On March 11, I investigated an outbreak at Kahua Ranch, Kohala District. It is probably the severest the ranch has experienced in many years. The ranch has a total of 32,000 acres of land and of this 8,000 acres of good pasture land were being severely damaged by two armyworms, *Laphygma exempta* (Walker) and *Pseudaletia unipuncta* (Haworth). It is worthy of note that the latter species was the cause of great concern in several states in 1953. "The outbreak in Tennessee was the worst on record, the worst since 1911 in Indiana and probably the most widespread and serious in the history of the state, while the situation in South Carolina was the most serious in many years. Other states had similar records. Plants attacked were primarily grains and grasses."[1]

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[1] Cooperative Economic Insect Report, Vol. 4 (2), p. 33-41, January 15, 1954.

Grasses attacked at Kahua Ranch were as follows:

a. Manienie grass	5,000 acres
b. Kikuyu grass	1,000 acres
c. Guinea grass	200 acres
d. Wild oats	200 acres
e. Wild clover	800 acres
f. Miscellaneous grasses	800 acres
Total	8,000 acres

Laphygma was the principal species in manienie grass, while *Pseudaletia* was found to be abundant in kikuyu grass (*Pennisetum clandestinum*) and wild oats (*Bromus* sp.). The other grasses appeared to be shared by both species of armyworms. *Laphygma* caterpillars were very active on *Cynodon dactylon* and parasitism appeared to be at a low level. However, the caterpillars of *Pseudaletia* were heavily attacked by a polyhedrosis virus disease which was identified by Dr. Y. Tanada, Insect Pathologist at the University of Hawaii. It was not unusual to find 7-12 or more diseased caterpillars per square foot of kikuyu grass in the makai section of Kahua Ranch. According to a report from Mr. Greenwell, manager of Kahua Ranch, dated March 29, he states that, "The infestation on the makai side of the road seems to be on the wane. Unfortunately, it is doing great damage on the mauka side of the road, cleaning out the paddocks." The mauka pastures are infested with *Laphygma*, and this species does not appear susceptible to the polyhedrosis virus of *P. unipuncta*.

Armyworms were active on Parker Ranch over a wide area, but infestations were very sporadic. On the basis of observations from the Parker Ranch boundary at Kahua to Puu Naonahae it was estimated that there were approximately 42,000 acres of manienie grass affected. The population density was not so great as it was at Kahua where 50 or more per square yard were counted.

Other areas surveyed were Kukaiau Ranch, South Point and Piikea Gulch, between Pahala and Kapapala Ranch. Of the five localities surveyed two have subsided while three are currently active. The infestation at Piikea Gulch is a classic example of biological control. Without question, the most effective parasite observed was *Meteorus laphygmae* Viereck. Cocoons of this parasite could be found by the thousands. In contrast to *Laphygma* caterpillars at Kahua, many were moribund and dead. Mynah birds were quite active in the vicinity and were undoubtedly taking a toll of the caterpillars. They were not observed at Kahua or Parker Ranch.

Following is a list of parasites and predators observed or reared from two active armyworm regions on the island:

	Kahua Ranch 3,200′ Elev.	**Piikea Bridge, Kau 1,000′ Elev.**
Polyhedrosis virus	*Pseudaletia unipuncta*	........*
Oechalia kaonohi	*Pseudaletia unipuncta* abundant *Laphygma exempta*	........*
Meteorus laphygmae	*Laphygma exempta* scarce	abundant
Frontina archippivora	abundant	abundant
Chaetogaedia monticola	few	abundant
Archytas cirphis	few	........*
Hyposoter exiguae	........*	few
Euplectrus plathypenae	........*	few
Apanteles marginiventris	probably *Pseudaletia*	........*
Pterocormus laetus	few	few
Pterocormus cupitus	few	few
Chelonus blackburni	........*	few
Chelonus texanus	........*	few
Pristomerus appalachianus	........*	few
Mynah birds	........*	many

* Not observed.

Worthy of note is the presence of the native pentatomid, *Oechalia kaonohi* Kirkaldy, at Kahua Ranch. Tanada observed this bug feeding on an armyworm caterpillar on March 17, and their populations were judged to be fairly heavy on that date. On March 24, they were found to be very abundant. This is the second lepidopterous outbreak of major intensity within a year, and both were preceded by an unusually long dry spell.

ACKNOWLEDGMENT

The identity of parasites, disease and predators was secured from several sources; notably, Q. C. Chock, Chief, Bureau of Pest Control, Board of Agriculture and Forestry; Drs. Y. Tanada and D. Elmo Hardy, Entomologists, University of Hawaii; and Fred Bianchi, Entomologist, H.S.P.A.

A Critical Review of the World Literature on the Lepidopterous Stalk Borers of Tropical Graminaceous Crops[1]
(A Review)

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Because of the wealth of information assembled in this volume, it constitutes an essential reference work for all entomologists concerned with lepidopterous stalk borers in tropical graminaceous crops. The review summarizes the major work accomplished on this broad subject in the tropics of the world. The author's long experience in applied entomology in the tropics and the mature judgement evidenced by him in evaluating the mass of literature pertaining to these stalk borers, has resulted in the compilation of a reference work far more useful than a simple bibliography. As a basis for the review the author cites 491 references to pertinent literature.

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[1] W. F. Jepson, O.B.E., Ph.D., Commonwealth Institute of Entomology, 41 Queen's Gate, London, S.W. 7. 127 pages, 1 fig. 1954. 15 shillings—post free.

In eight separate sections or chapters, the volume covers synonomy, systematics, host-range, bionomics, population estimation and damage assessment systems, cultural practices in relation to borer control, natural control and chemical control. Table 1 of Section 1 lists 46 species of lepidopterous borers, giving the presently accepted name, family, former name if different, common name, crop affected and the region occupied. This table very handily clarifies the confusion of names appearing in literature. Section 2 deals with the value of the systematic work done during the past 20 years and discusses the important characters used in the identification of the adult moths, with particular reference to the genera. In Section 3, covering host-range of the stalk borers, the major feature is Table 2, with 182 items, referring to the host-plant name, its common name, the borer or borers attacking it and where, and finally, in each case, the source literature for the item.

Section 4, though compacted in only 13 pages, presents much very useful information on the life histories of many of the important borers, together with descriptions of key characters of the various stages, emphasizing the danger of field workers in making hasty identifications of a number of important species that superficially appear almost identical, but whose habits and hosts may be quite different. The effect of varying climatic conditions on borer populations, as discussed by several investigators, is also reviewed.

Methods of estimating insect populations and the damage caused by them are by no means uniform. Dr. Jepson reviews the methods and conclusions adopted by several investigators, with interesting comment. The relation of cultural practices to stalk borer development and damage has received much attention by most entomologists engaged in work on stalk borer problems. The author reviews some of the important literature on this subject.

The general problem of control, involving cultural, chemical and biological methods, is given very thorough attention and is highly instructive, since the author reviews a large amount of literature covering these fields and concludes with recommendations that warrant careful consideration by all interested persons. It is very fortunate, for the purposes of convenience, that the volume has a complete index of the insect names mentioned throughout the book.

A New Oodemas from Oahu (Coleoptera: Curculionidae)

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The cossonid weevil described herein is the fourteenth species of the endemic genus *Oodemas* known to inhabit Oahu. It is of special interest because it is the smallest species yet described in the genus.

To include it in Dr. Perkins' key to the Oahu species ("PROCEEDINGS" 9:78, 1935), refer the second part of couplet 11 to couplet 12, then read as follows:

12. Pronotum dull; 3 mm. or more............................**ramulorum** Perkins
Pronotum shining; less than 3 mm..............................**palikeum** n. sp.

Oodemas palikeum new species

Male: Slightly aenescent, almost black, the pronotum not so roughly sculptured as the elytra, hence more shining. Head reticulate with conspicuous but rather sparse punctures; the eyes very small, slightly oblong, and convex with facets unequal in size. Rostrum slightly wider in front of the antennal insertion and about one-third longer than the distance between the eyes; dorsally, longitudinally sinuate, the grooves apparently formed by elongation of the punctures, becoming longer and deeper distally; epistome deeply emarginate at the middle with a few short setae inserted just behind the outer margin. Antennae inserted on the rostrum at the middle, the scape not quite reaching the hind margin of the eye, dilated apically; first funicle segment half as long as the scape and equal in length to the second segment; segments three to seven subequal in length, each with two or three silvery setae slanting forward about forty-five degrees; club rather densely pubescent, and as long as the preceding five segments together. Prothorax reticulate, sparsely, evenly punctate, about one-eighth longer than wide, the sides converging anteriorly; basal margin evenly convex. Elytra elongate-oval, slightly longer than twice the length of the pronotum, and a third again as wide as the base of the pronotum, almost evenly arcuate at the sides from base to apex; striae visible near the suture but feebly impressed, becoming deeper outwardly; strial punctures smaller, shallower, and not serially arranged; reticular areas absent. Legs rather short, sturdy and black except for a tendency to redden distally; femora swollen and feebly punctate with very sparse, short, white setae; front tibiae with numerous setae distally, and the spur slightly curved; tarsi large with the first segment one-third again as long and two-thirds as wide as the second; second segment two-thirds as long as the third and slightly narrower; fourth segment inserted in the middle of the deeply bilobed third; fourth segment as long as the third, second, and half of the first combined. Metasternum with large deep punctures. Venter with the first ventrite reticulate and deeply, sparsely punctate in front, but with shallow, inconspicuous punctures behind; second ventrite also reticulate with irregular sparse punctures; third ventrite smooth and shining, narrow longitudinally, rod-like with very sparse punctures on the crest; fourth ventrite similar to the third, but with an almost uniform row of punctures on the crest; fifth ventrite smooth and finely punctured, punctures more numerous behind; fifth ventrite as long as the second. Length, including the head, 2.2 mm.; breadth, 1.1 mm.

Allotype: abdomen more swollen; the antennae slightly more slender. Length, 2.3 mm.; breadth, 1.4 mm. Paratypes: 13 specimens; length, 2-2.5 mm.

Type locality: Palikea Peak, Waianae Mountains, windward side, altitude, 2,700 feet.

Holotype male and allotype in the Bernice P. Bishop Museum, 4 paratypes in the U. S. National Museum, and nine paratypes in the collection of the author.

Fifteen specimens were collected by the author in dead stems of an endemic *Bidens* from April through June 1953. *Oodemas palikeum* is apparently host-specific, as indicated by the following observations: Swezey and Perkins recorded *O. angustum* Blackburn on several kinds of plants in the same locality but not on *Bidens* ("PROCEEDINGS" 9:77, 1935); however, the author found several specimens of *angustum* in company with *palikeum*. Furthermore, specimens of *angustum* were found in *Euphorbia hillebrandii* growing beside the *Bidens,* but no specimens of *palikeum*. It would seem that previous collectors have neglected *Bidens,* since few insect records have been obtained from it.

The identification of *palikeum* is greatly facilitated by its small size, dull color, and rough elytral sculpture. It can only be confused with small specimens of *angustum* or *O. ramulorum* Perkins. From the former, *palikeum* may be distinguished by its more elongate form as compared to the robust, smooth, bright, aenescent *angustum*. The latter species differs in having a rather rough reticulation and more dense punctuation on the prothorax; and therefore, is not so shining as *palikeum*.